

**SAF-RC-232**  
**100-IU-2 & 100-IU-6 Remaining**  
**Waste Sites – Soil Full Protocol**  
**FINAL VALIDATION PACKAGE**

**COMPLETE COPY OF VALIDATION PACKAGE TO:**

Kathy Wendt            H4-21            KW 3/26/14  
    INITIAL/DATE

**COMMENTS:**

**SDG XP0045            SAF-RC-232**

**Sample Location:    600-383**

Date: 14 March 2014  
To: Washington Closure Hanford Inc. (technical representative)  
From: ELR Consulting  
Project: 100-IU-2 & 100-IU-6 Remaining Waste Sites – Soil Full Protocol - Waste Site 600-383  
Subject: Metals - Data Package No. XP0045-GEL

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. XP0045 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1T5M	1/30/14	Soil	C	See note 1
J1T5M	1/30/14	Soil	C	See note 1
J1T5M	1/30/14	Soil	C	See note 1
J1T5M	1/30/14	Soil	C	See note 1
J1T5N0	1/30/14	Soil	C	See note 1
J1T5N1	1/30/14	Soil	C	See note 1
J1T5N2	1/30/14	Soil	C	See note 1
J1T5N3	1/30/14	Soil	C	See note 1
J1T5N4	1/30/14	Soil	C	See note 1
J1T5N5	1/30/14	Soil	C	See note 1
J1T5N6	1/30/14	Soil	C	See note 1
J1T5N7	1/30/14	Soil	C	See note 1
J1T5N8	1/30/14	Soil	C	See note 1
J1T5N9	1/30/14	Soil	C	See note 1
J1T5P0	1/30/14	Soil	C	See note 1

1 – Metals by 7471B & mercury by 7471B.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation
- Appendix 6. Additional Documentation Requested by Client

## **DATA QUALITY PARAMETERS**

### **Holding Times**

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals and 28 days for mercury.

All holding times were acceptable.

### **Preparation (Method) Blanks**

#### Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "UJ". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the contract required detection limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the instrument detection limit (IDL) and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

Due to method blank contamination, the sodium and zinc results in sample J1T5P0 were qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

#### Field (Equipment) Blank

One field blank (J1T5P0) was submitted for analysis. Ten analytes were detected in the field blank. Under the WCH statement of work, no qualification is required.

## **Accuracy**

### Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 75% to 125%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 125% or less than 74% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 125% and a sample result less than the IDL, no qualification is required.

Due to matrix spike recoveries outside QC limits, all silicon (15.8% & 8.06%) results were qualified as estimates and flagged "J".

Due to a matrix spike recovery outside QC limits (69.5%), the barium result in samples J1T5N7, J1T5N8, J1T5N9 and J1T5P0 were qualified as estimates ad flagged "J".

All other accuracy results were acceptable.

## **Precision**

### Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than 30%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All laboratory duplicate results were acceptable.

### Field Duplicate

One set of field duplicates (J1T5M6/J1T5N9) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

### **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area RQLs to ensure that laboratory detection levels meet the required criteria. All results met the RQL.

### **Completeness**

Data package No. XP0045 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

## **MAJOR DEFICIENCIES**

None found.

## **MINOR DEFICIENCIES**

The following minor deficiencies were noted:

- Due to method blank contamination, the sodium and zinc results in sample J1T5P0 were qualified as undetected and flagged "UJ".
- Due to matrix spike recoveries outside QC limits, all silicon (15.8% & 8.06%) results were qualified as estimates and flagged "J".
- Due to a matrix spike recovery outside QC limits (69.5%), the barium result in samples J1T5N7, J1T5N8, J1T5N9 and J1T5P0 were qualified as estimates ad flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

## **REFERENCES**

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

Qualifiers which may be applied by data validators in compliance with WCH validation SOW are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

**Appendix 2**  
**Summary of Data Qualification**

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INORGANICS DATA QUALIFICATION SUMMARY\*

SDG: XP0045	REVIEWER: ELR	Project: 600-383	PAGE <u>1</u> OF <u>1</u>
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Sodium Zinc	UJ	J1T5P0	Method blank contamination
Silicon	J	All	MS recovery
Barium	J	J1T5N7, J1T5N8, J1T5N9, J1T5P0	MS recovery

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

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**Appendix 3**  
**Annotated Laboratory Reports**

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**GEL LABORATORIES LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JIT5M6  
 Sample ID: 342226001  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 09:20  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 12.4%

Project: WCHN00213  
 Client ID: WCHN001

V  
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0212		0.00459	0.0137	mg/kg	1	NORI	02/04/14	1057	1363969
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic		3.85		0.500	3.00	mg/kg	1	HSC	02/05/14	1735	1363646
Barium	N	89.5		0.100	0.500	mg/kg	1				
Beryllium		0.743		0.100	0.500	mg/kg	1				
Boron	U	1.00		1.00	5.00	mg/kg	1				
Cadmium	B	0.166		0.100	0.500	mg/kg	1				
Calcium		3200		8.00	25.0	mg/kg	1				
Copper		13.1		0.300	1.00	mg/kg	1				
Iron		21900		8.00	25.0	mg/kg	1				
Magnesium		4590		8.50	30.0	mg/kg	1				
Manganese		381		0.200	1.00	mg/kg	1				
Molybdenum	B	0.246		0.200	1.00	mg/kg	1				
Nickel		11.3		0.150	0.500	mg/kg	1				
Silicon	*N	401		1.50	10.0	mg/kg	1				
Silver	U	0.100		0.100	0.500	mg/kg	1				
Aluminum		7510		6.80	20.0	mg/kg	1	HSC	02/06/14	1954	1363646
Chromium		11.7		0.150	0.500	mg/kg	1				
Antimony	DU	3.30		3.30	10.0	mg/kg	10	JWJ	02/07/14	1117	1363646
Cobalt	D	11.6		1.50	5.00	mg/kg	10				
Lead	D	19.7		3.30	10.0	mg/kg	10				
Potassium	D	2510		64.0	250	mg/kg	10				
Vanadium	D	54.9		1.00	5.00	mg/kg	10				
Zinc	DN	94.3		4.00	10.0	mg/kg	10				
Sodium		151		7.00	25.0	mg/kg	1	HSC	02/07/14	1403	1363646
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.349		0.349	1.06	mg/kg	2	SKJ	02/06/14	0419	1363689

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JIT5M7      Project: WCHN00213  
 Sample ID: 342226002      Client ID: WCHN001  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 10:00  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 7.39%

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury	U	0.00423	0.00423	0.0126	mg/kg	1	NORI	02/04/14	1109	1363969	1
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic		3.07	0.510	3.06	mg/kg	1	HSC	02/05/14	1746	1363646	2
Barium	N	80.2	0.102	0.510	mg/kg	1					
Beryllium		0.758	0.102	0.510	mg/kg	1					
Boron	U	1.02	1.02	5.10	mg/kg	1					
Cadmium	U	0.102	0.102	0.510	mg/kg	1					
Calcium		4220	8.16	25.5	mg/kg	1					
Copper		13.7	0.306	1.02	mg/kg	1					
Iron		23700	8.16	25.5	mg/kg	1					
Magnesium		5010	8.67	30.6	mg/kg	1					
Manganese		337	0.204	1.02	mg/kg	1					
Molybdenum	B	0.323	0.204	1.02	mg/kg	1					
Nickel		11.3	0.153	0.510	mg/kg	1					
Silicon	*N S	375	1.53	10.2	mg/kg	1					
Silver	U	0.102	0.102	0.510	mg/kg	1					
Aluminum		6030	6.94	20.4	mg/kg	1	HSC	02/06/14	2005	1363646	3
Chromium		10.6	0.153	0.510	mg/kg	1					
Antimony	DU	3.37	3.37	10.2	mg/kg	10	JWJ	02/07/14	1129	1363646	4
Cobalt	D	13.9	1.53	5.10	mg/kg	10					
Lead	D	18.9	3.37	10.2	mg/kg	10					
Potassium	D	1810	65.3	255	mg/kg	10					
Vanadium	D	68.9	1.02	5.10	mg/kg	10					
Zinc	DN	58.4	4.08	10.2	mg/kg	10					
Sodium		146	7.14	25.5	mg/kg	1	HSC	02/07/14	1424	1363646	5
<b>Metals Analysis-ICP-MS</b>											
<b>SW846 3050B/6020A Selenium "Dry Weight Corrected"</b>											
Selenium	DU	0.347	0.347	1.05	mg/kg	2	SKJ	02/06/14	0501	1363689	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

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**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JIT5M8  
 Sample ID: 342226003  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 09:40  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 3.95%

Project: WCHN00213  
 Client ID: WCHN001

13/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury		0.299		0.00395	0.0118	mg/kg	1	NOR1	02/04/14	1110	1363969
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic	B	2.51		0.503	3.02	mg/kg	1	HSC	02/05/14	1756	1363646
Barium	N	71.6		0.101	0.503	mg/kg	1				
Beryllium		0.628		0.101	0.503	mg/kg	1				
Boron	U	1.01		1.01	5.03	mg/kg	1				
Cadmium		10.8		0.101	0.503	mg/kg	1				
Calcium		2620		8.06	25.2	mg/kg	1				
Copper		17.6		0.302	1.01	mg/kg	1				
Iron		19200		8.06	25.2	mg/kg	1				
Magnesium		3660		8.56	30.2	mg/kg	1				
Manganese		366		0.201	1.01	mg/kg	1				
Molybdenum	U	0.201		0.201	1.01	mg/kg	1				
Nickel		9.37		0.151	0.503	mg/kg	1				
Silicon	*N	413		1.51	10.1	mg/kg	1				
Silver	U	0.101		0.101	0.503	mg/kg	1				
Aluminum		6010		6.85	20.1	mg/kg	1	HSC	02/06/14	2014	1363646
Chromium		10.1		0.151	0.503	mg/kg	1				
Antimony	DU	3.32		3.32	10.1	mg/kg	10	JWJ	02/07/14	1132	1363646
Cobalt	D	9.14		1.51	5.03	mg/kg	10				
Lead	D	30.9		3.32	10.1	mg/kg	10				
Potassium	D	1570		64.4	252	mg/kg	10				
Vanadium	D	48.6		1.01	5.03	mg/kg	10				
Zinc	DN	659		4.03	10.1	mg/kg	10				
Sodium		135		7.05	25.2	mg/kg	1	HSC	02/07/14	1426	1363646
<b>Metals Analysis-ICP-MS</b>											
<b>SW846 3050B/6020A Selenium "Dry Weight Corrected"</b>											
Selenium	DU	0.337		0.337	1.02	mg/kg	2	SKJ	02/06/14	0507	1363689

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

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2040 Savage Road Charleston SC 29407 - (843) 558-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JIT5M9  
 Sample ID: 342226004  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 09:45  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 5.31%

Project: WCHN00213  
 Client ID: WCHN001

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0877		0.00408	0.0122	mg/kg	1	NOR1	02/04/14	1112	1363969
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	B	2.21		0.482	2.89	mg/kg	1	HSC	02/05/14	1758	1363646
Barium	N	71.3		0.0964	0.482	mg/kg	1				
Beryllium		0.576		0.0964	0.482	mg/kg	1				
Boron	U	0.964		0.964	4.82	mg/kg	1				
Cadmium		3.84		0.0964	0.482	mg/kg	1				
Calcium		2680			7.71	24.1	mg/kg	1			
Copper		10.8		0.289	0.964	mg/kg	1				
Iron		17500			7.71	24.1	mg/kg	1			
Magnesium		3530			8.19	28.9	mg/kg	1			
Manganese		322			0.193	0.964	mg/kg	1			
Molybdenum	U	0.193			0.193	0.964	mg/kg	1			
Nickel		9.16			0.145	0.482	mg/kg	1			
Silicon	*N	314			1.45	9.64	mg/kg	1			
Silver	U	0.0964			0.0964	0.482	mg/kg	1			
Aluminum		5090			6.55	19.3	mg/kg	1	HSC	02/06/14	2017
Chromium		8.88			0.145	0.482	mg/kg	1			3
Antimony	DU	3.18			3.18	9.64	mg/kg	10	JWJ	02/07/14	1135
Cobalt	D	9.70			1.45	4.82	mg/kg	10			1363646
Lead	D	12.0			3.18	9.64	mg/kg	10			4
Potassium	D	1330			61.7	241	mg/kg	10			
Vanadium	D	45.2			0.964	4.82	mg/kg	10			
Zinc	DN	255			3.85	9.64	mg/kg	10			
Sodium		110			6.75	24.1	mg/kg	1	HSC	02/07/14	1429
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.313		0.313	1.00	mg/kg	2	SKJ	02/06/14	0513	1363689

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/03/14	1619	1363967

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JIT5N0  
 Sample ID: 342226005  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 09:50  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 5%

Project: WCHN00213  
 Client ID: WCHN001

V3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0737		0.00407	0.0121	mg/kg	1	NORI	02/04/14	1114	1363969
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic		2.95		0.467	2.80	mg/kg	1	HSC	02/05/14	1801	1363646
Barium	N	69.8		0.0933	0.467	mg/kg	1				
Beryllium		0.572		0.0933	0.467	mg/kg	1				
Boron	U	0.933		0.933	4.67	mg/kg	1				
Cadmium		5.98		0.0933	0.467	mg/kg	1				
Calcium		2540			7.47	23.3	mg/kg	1			
Copper		10.6		0.280	0.933	mg/kg	1				
Iron		17500			7.47	23.3	mg/kg	1			
Magnesium		3570			7.93	28.0	mg/kg	1			
Manganese		326			0.187	0.933	mg/kg	1			
Molybdenum	B	0.339			0.187	0.933	mg/kg	1			
Nickel		9.17			0.140	0.467	mg/kg	1			
Silicon	*N	305			1.40	9.33	mg/kg	1			
Silver	U	0.0933			0.0933	0.467	mg/kg	1			
Aluminum		5200			6.35	18.7	mg/kg	1	HSC	02/06/14	2019
Chromium		9.41			0.140	0.467	mg/kg	1			
Antimony	DU	3.08			3.08	9.33	mg/kg	10	JWJ	02/07/14	1144
Cobalt	D	8.95			1.40	4.67	mg/kg	10			
Lead	BD	8.72			3.08	9.33	mg/kg	10			
Potassium	D	1210			59.7	233	mg/kg	10			
Vanadium	D	45.0			0.933	4.67	mg/kg	10			
Zinc	DN	149			3.73	9.33	mg/kg	10			
Sodium		121			6.53	23.3	mg/kg	1	HSC	02/07/14	1432
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.315		0.315	1.00	mg/kg	2	SKJ	02/06/14	0519	1363689

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/03/14	1619	1363967

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - [www.gel.com](http://www.gel.com)

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID:	J1TSN1	Project:	WCHN00213
Sample ID:	342226006	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	30-JAN-14 10:25		
Receive Date:	31-JAN-14		
Collector:	Client		
Moisture:	8.12%		

V3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury		0.0208		0.00428	0.0128	mg/kg	1	NORI	02/04/14	1115	1363969
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic		10.2		0.484	2.90	mg/kg	1	HSC	02/05/14	1804	1363646
Barium	N	147		0.0968	0.484	mg/kg	1				
Beryllium		0.721		0.0968	0.484	mg/kg	1				
Boron	U	0.968		0.968	4.84	mg/kg	1				
Cadmium		8.93		0.0968	0.484	mg/kg	1				
Calcium		2880		7.75	24.2	mg/kg	1				
Copper		14.4		0.290	0.968	mg/kg	1				
Iron		21600		7.75	24.2	mg/kg	1				
Magnesium		4070		8.23	29.0	mg/kg	1				
Molybdenum	U	0.194		0.194	0.968	mg/kg	1				
Nickel		10.4		0.145	0.484	mg/kg	1				
Silicon	*N S	333		1.45	9.68	mg/kg	1				
Silver	B	0.251		0.0968	0.484	mg/kg	1				
Aluminum		5770		6.58	19.4	mg/kg	1	HSC	02/06/14	2022	1363646
Antimony	DU	3.20		3.20	9.68	mg/kg	10	JWJ	02/07/14	1147	1363646
Cobalt	D	13.4		1.45	4.84	mg/kg	10				
Lead	D	43.2		3.20	9.68	mg/kg	10				
Potassium	D	2280		62.0	242	mg/kg	10				
Vanadium	D	52.9		0.968	4.84	mg/kg	10				
Zinc	DN	1030		3.87	9.68	mg/kg	10				
Sodium		119		6.78	24.2	mg/kg	1	HSC	02/07/14	1434	1363646
Chromium	D	10.2		1.45	4.84	mg/kg	10	HSC	02/10/14	1707	1363646
Manganese	D	1890		1.94	9.68	mg/kg	10				
<b>Metals Analysis-ICP-MS</b>											
<b>SW846 3050B/6020A Selenium "Dry Weight Corrected"</b>											
Selenium	DU	0.349		0.349	1.06	mg/kg	2	SKJ	02/06/14	0525	1363689

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID:	J1T5N2	Project:	WCHN00213
Sample ID:	342226007	Client ID:	WCHN001
Matrix:	SOIL	<i>✓ 3/22/14</i>	
Collect Date:	30-JAN-14 10:30		
Receive Date:	31-JAN-14		
Collector:	Client		
Moisture:	7.12%		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury		0.105	0.00389	0.0116	mg/kg	1	NORI	02/04/14	1117	1363969	1
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic		4.36	0.510	3.06	mg/kg	1	HSC	02/05/14	1807	1363646	2
Barium	N	96.6	0.102	0.510	mg/kg	1					
Beryllium		0.715	0.102	0.510	mg/kg	1					
Boron	U	1.02	1.02	5.10	mg/kg	1					
Cadmium		1.96	0.102	0.510	mg/kg	1					
Calcium		2970	8.16	25.5	mg/kg	1					
Copper		13.4	0.306	1.02	mg/kg	1					
Iron		20500	8.16	25.5	mg/kg	1					
Magnesium		4070	8.67	30.6	mg/kg	1					
Molybdenum	B	0.426	0.204	1.02	mg/kg	1					
Nickel		11.9	0.153	0.510	mg/kg	1					
Silicon	*N	330	1.53	10.2	mg/kg	1					
Silver	U	0.102	0.102	0.510	mg/kg	1					
Aluminum		5920	6.93	20.4	mg/kg	1	HSC	02/06/14	2025	1363646	3
Antimony	DU	3.36	3.36	10.2	mg/kg	10	JWJ	02/07/14	1150	1363646	4
Cobalt	D	12.2	1.53	5.10	mg/kg	10					
Lead	D	50.7	3.36	10.2	mg/kg	10					
Potassium	D	2270	65.3	255	mg/kg	10					
Vanadium	D	53.8	1.02	5.10	mg/kg	10					
Zinc	DN	650	4.08	10.2	mg/kg	10					
Sodium		127	7.14	25.5	mg/kg	1	HSC	02/07/14	1437	1363646	5
Chromium	D	10.9	1.53	5.10	mg/kg	10	HSC	02/10/14	1710	1363646	6
Manganese	D	1500	2.04	10.2	mg/kg	10					
<b>Metals Analysis-ICP-MS</b>											
<b>SW846 3050B/6020A Selenium "Dry Weight Corrected"</b>											
Selenium	DU	0.344	0.344	1.04	mg/kg	2	SKJ	02/06/14	0543	1363689	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

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**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JITSN3  
 Sample ID: 342226008  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 10:10  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 7.44%

Project: WCHN00213  
 Client ID: WCHN001

2/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	D	0.744	0.00847	0.0253	mg/kg	2	NORI	02/04/14	1141	1363969	1
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic		4.46		0.510	3.06	mg/kg	1	HSC	02/05/14	1809	1363646
Barium	N	83.1		0.102	0.510	mg/kg	1				
Beryllium		0.657		0.102	0.510	mg/kg	1				
Boron	U	1.02		1.02	5.10	mg/kg	1				
Cadmium		5.06		0.102	0.510	mg/kg	1				
Calcium		2890		8.15	25.5	mg/kg	1				
Copper		16.4		0.306	1.02	mg/kg	1				
Iron		27200		8.15	25.5	mg/kg	1				
Magnesium		3820		8.66	30.6	mg/kg	1				
Manganese		914		0.204	1.02	mg/kg	1				
Molybdenum	U	0.204		0.204	1.02	mg/kg	1				
Nickel		63.3		0.153	0.510	mg/kg	1				
Silicon	*N	347		1.53	10.2	mg/kg	1				
Silver	U	0.102		0.102	0.510	mg/kg	1				
Aluminum		4950		6.93	20.4	mg/kg	1	HSC	02/06/14	2027	1363646
Chromium		9.18		0.153	0.510	mg/kg	1				
Antimony	DU	3.36		3.36	10.2	mg/kg	10	JWJ	02/07/14	1153	1363646
Cobalt	D	10.9		1.53	5.10	mg/kg	10				
Lead	D	181		3.36	10.2	mg/kg	10				
Potassium	D	2550		65.2	255	mg/kg	10				
Vanadium	D	50.7		1.02	5.10	mg/kg	10				
Zinc	DN	1670		4.08	10.2	mg/kg	10				
Sodium		182		7.13	25.5	mg/kg	1	HSC	02/07/14	1440	1363646
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.344	0.344	1.04	mg/kg	2	SKJ	02/06/14	0549	1363689	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

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**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington 99354

Contact:  
Project:

Joan Kessner  
RC-232 Soil

Client SDG: XP0045

Client Sample ID: J1T5N4  
Sample ID: 342226009  
Matrix: SOIL  
Collect Date: 30-JAN-14 10:35  
Receive Date: 31-JAN-14  
Collector: Client  
Moisture: 8.23%

Project: WCHN00213  
Client ID: WCHN001

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00413	0.00413	0.0123	mg/kg	1	NORI	02/04/14	1120	1363969	1
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic		3.53	0.545	3.27	mg/kg	1	HSC	02/05/14	1812	1363646	2
Barium	N	81.4	0.109	0.545	mg/kg	1					
Beryllium		0.587	0.109	0.545	mg/kg	1					
Boron	U	1.09	1.09	5.45	mg/kg	1					
Cadmium	B	0.119	0.109	0.545	mg/kg	1					
Calcium		3060	8.72	27.2	mg/kg	1					
Copper		10.9	0.327	1.09	mg/kg	1					
Iron		17600	8.72	27.2	mg/kg	1					
Magnesium		4050	9.26	32.7	mg/kg	1					
Manganese		329	0.218	1.09	mg/kg	1					
Molybdenum	B	0.273	0.218	1.09	mg/kg	1					
Nickel		10.3	0.163	0.545	mg/kg	1					
Silicon	*N	484	1.63	10.9	mg/kg	1					
Silver	U	0.109	0.109	0.545	mg/kg	1					
Aluminum		5370	7.41	21.8	mg/kg	1	HSC	02/06/14	2030	1363646	3
Chromium		10.3	0.163	0.545	mg/kg	1					
Cobalt		9.23	0.163	0.545	mg/kg	1	JWJ	02/07/14	1156	1363646	4
Lead		34.0	0.360	1.09	mg/kg	1					
Potassium		1840	6.97	27.2	mg/kg	1					
Vanadium		40.5	0.109	0.545	mg/kg	1					
Zinc	N	39.0	0.436	1.09	mg/kg	1					
Antimony	DU	3.60	3.60	10.9	mg/kg	10	JWJ	02/07/14	1204	1363646	5
Sodium		99.8	7.63	27.2	mg/kg	1	HSC	02/07/14	1442	1363646	6
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.346	0.346	1.05	mg/kg	2	SKJ	02/06/14	0555	1363689	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/03/14	1619	1363967

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JIT5NS  
 Sample ID: 342226010  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 11:00  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 12.7%

Project: WCHN00213  
 Client ID: WCHN001

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury	B	0.00521	0.00447	0.0133	mg/kg	1	NOR1	02/04/14	1122	1363969	1
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic		3.17	0.512	3.07	mg/kg	1	HSC	02/05/14	1815	1363646	2
Barium	N	91.6	0.102	0.512	mg/kg	1					
Beryllium		0.740	0.102	0.512	mg/kg	1					
Boron	U	1.02	1.02	5.12	mg/kg	1					
Cadmium	B	0.157	0.102	0.512	mg/kg	1					
Calcium		3340	8.20	25.6	mg/kg	1					
Copper		13.5	0.307	1.02	mg/kg	1					
Iron		20900	8.20	25.6	mg/kg	1					
Magnesium		4580	8.71	30.7	mg/kg	1					
Manganese		378	0.205	1.02	mg/kg	1					
Molybdenum	U	0.205	0.205	1.02	mg/kg	1					
Nickel		12.1	0.154	0.512	mg/kg	1					
Silicon	*N	383	1.54	10.2	mg/kg	1					
Silver	U	0.102	0.102	0.512	mg/kg	1					
Aluminum		7170	6.97	20.5	mg/kg	1	HSC	02/06/14	2033	1363646	3
Chromium		12.1	0.154	0.512	mg/kg	1					
Antimony	DU	3.38	3.38	10.2	mg/kg	10	JWJ	02/07/14	1158	1363646	4
Cobalt	D	11.9	1.54	5.12	mg/kg	10					
Lead	BD	8.94	3.38	10.2	mg/kg	10					
Potassium	D	2280	65.6	256	mg/kg	10					
Vanadium	D	54.4	1.02	5.12	mg/kg	10					
Zinc	DN	49.3	4.10	10.2	mg/kg	10					
Sodium		122	7.17	25.6	mg/kg	1	HSC	02/07/14	1445	1363646	5
<b>Metals Analysis-ICP-MS</b>											
<b>SW846 3050B/6020A Selenium "Dry Weight Corrected"</b>											
Selenium	DU	0.326	0.326	1.00	mg/kg	2	SKJ	02/06/14	0601	1363689	6

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

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**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
Address : 2620 Fermi Avenue  
MSIN H4-21

Richland, Washington 99354

Contact: Joan Kessner  
Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: J1TSN6  
Sample ID: 342226011  
Matrix: SOIL  
Collect Date: 30-JAN-14 11:05  
Receive Date: 31-JAN-14  
Collector: Client  
Moisture: 13.1%

Project: WCHN00213  
Client ID: WCHN001

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00441		0.00441	0.0132	mg/kg	1	NORI	02/04/14	1127	1363969
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic		3.45		0.567	3.40	mg/kg	1	HSC	02/05/14	1817	1363646
Barium	N	88.6		0.113	0.567	mg/kg	1				
Beryllium		0.683		0.113	0.567	mg/kg	1				
Boron	U	1.13		1.13	5.67	mg/kg	1				
Cadmium	B	0.161		0.113	0.567	mg/kg	1				
Calcium		3070		9.08	28.4	mg/kg	1				
Copper		11.3		0.340	1.13	mg/kg	1				
Iron		19700		9.08	28.4	mg/kg	1				
Magnesium		4320		9.65	34.0	mg/kg	1				
Manganese		369		0.227	1.13	mg/kg	1				
Molybdenum	U	0.227		0.227	1.13	mg/kg	1				
Nickel		11.4		0.170	0.567	mg/kg	1				
Silicon	*N	683		1.70	11.3	mg/kg	1				
Silver	U	0.113		0.113	0.567	mg/kg	1				
Aluminum		6590		7.72	22.7	mg/kg	1	HSC	02/06/14	2035	1363646
Chromium		11.5		0.170	0.567	mg/kg	1				
Cobalt		10.1		0.170	0.567	mg/kg	1	JWJ	02/07/14	1201	1363646
Lead		6.66		0.375	1.13	mg/kg	1				
Potassium		2000		7.26	28.4	mg/kg	1				
Vanadium		46.0		0.113	0.567	mg/kg	1				
Zinc	N	45.8		0.454	1.13	mg/kg	1				
Antimony	DU	3.75		3.75	11.3	mg/kg	10	JWJ	02/07/14	1208	1363646
Sodium		103		7.94	28.4	mg/kg	1	HSC	02/07/14	1448	1363646
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.349		0.349	1.06	mg/kg	2	SKJ	02/06/14	0607	1363689

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363688
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363645
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXSS	02/03/14	1619	1363967

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**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: JITSN7  
 Sample ID: 342226012  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 10:22  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 15.3%

Project: WCHN00213  
 Client ID: WCHN001

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.200		0.00472	0.0141	mg/kg	1	NORI	02/04/14	1129	1363969
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	B	2.86		0.555	3.33	mg/kg	1	HSC	02/05/14	1623	1363648
Barium	N	82.4		0.111	0.555	mg/kg	1				
Beryllium		0.623		0.111	0.555	mg/kg	1				
Boron	U	1.11		1.11	5.55	mg/kg	1				
Cadmium	B	0.478		0.111	0.555	mg/kg	1				
Calcium		3060		8.88	27.8	mg/kg	1				
Chromium		13.0		0.167	0.555	mg/kg	1				
Copper		32.3		0.333	1.11	mg/kg	1				
Iron		19100		8.88	27.8	mg/kg	1				
Magnesium		3950		9.44	33.3	mg/kg	1				
Manganese		380		0.222	1.11	mg/kg	1				
Molybdenum	B	0.249		0.222	1.11	mg/kg	1				
Nickel		11.1		0.167	0.555	mg/kg	1				
Silicon	*N	385		1.67	11.1	mg/kg	1				
Silver	U	0.111		0.111	0.555	mg/kg	1				
Aluminum		6360		7.55	22.2	mg/kg	1	HSC	02/06/14	1053	1363648
Sodium		74.4		7.77	27.8	mg/kg	1				
Antimony	DU	1.83		5.55	mg/kg	5	JWJ	02/07/14	1350	1363648	4
Cobalt	D	9.70		0.833	2.78	mg/kg	5				
Lead	D	37.8		1.83	5.55	mg/kg	5				
Vanadium	D	42.6		0.555	2.78	mg/kg	5				
Potassium		2190		7.10	27.8	mg/kg	1	HSC	02/10/14	0839	1363648
Zinc	DN	172		2.30	5.74	mg/kg	5	HSC	02/10/14	1349	1365747
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.380		0.380	1.15	mg/kg	2	SKJ	02/05/14	1745	1363691

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363690
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	02/10/14	1205	1365746
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363647

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID:	JIT5N8	Project:	WCHN00213
Sample ID:	342226013	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	30-JAN-14 10:45		
Receive Date:	31-JAN-14		
Collector:	Client		
Moisture:	11.1%		

V  
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
<b>SW846 7471B Mercury in Solid "Dry Weight Corrected"</b>											
Mercury	U	0.00435	0.00435	0.013	mg/kg	1	NORI	02/04/14	1130	1363969	1
<b>Metals Analysis-ICP</b>											
<b>ICP METALS 6010TR Close-out List "Dry Weight Corrected"</b>											
Arsenic		3.68	0.512	3.07	mg/kg	1	HSC	02/05/14	1615	1363648	2
Barium	N	92.5	0.102	0.512	mg/kg	1					
Beryllium		0.727	0.102	0.512	mg/kg	1					
Boron	U	1.02	1.02	5.12	mg/kg	1					
Cadmium	B	0.125	0.102	0.512	mg/kg	1					
Calcium		3280	8.19	25.6	mg/kg	1					
Chromium		13.5	0.154	0.512	mg/kg	1					
Copper		13.6	0.307	1.02	mg/kg	1					
Iron		21900	8.19	25.6	mg/kg	1					
Magnesium		4750	8.70	30.7	mg/kg	1					
Manganese		363	0.205	1.02	mg/kg	1					
Molybdenum	B	0.250	0.205	1.02	mg/kg	1					
Nickel		12.7	0.154	0.512	mg/kg	1					
Silicon	*N	366	1.54	10.2	mg/kg	1					
Silver	U	0.102	0.102	0.512	mg/kg	1					
Aluminum		7630	6.96	20.5	mg/kg	1	HSC	02/06/14	1045	1363648	3
Sodium		80.8	7.17	25.6	mg/kg	1					
Antimony	DU	1.69	1.69	5.12	mg/kg	5	JWJ	02/07/14	1341	1363648	4
Cobalt	D	11.7	0.768	2.56	mg/kg	5					
Lead	D	8.21	1.69	5.12	mg/kg	5					
Vanadium	D	51.0	0.512	2.56	mg/kg	5					
Potassium		2150	6.55	25.6	mg/kg	1	HSC	02/10/14	0830	1363648	5
Zinc	DN	44.9	2.14	5.35	mg/kg	5	HSC	02/10/14	1337	1365747	6
<b>Metals Analysis-ICP-MS</b>											
<b>SW846 3050B/6020A Selenium "Dry Weight Corrected"</b>											
Selenium	DU	0.318	0.318	1.00	mg/kg	2	SKJ	02/05/14	1805	1363691	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363690
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	02/10/14	1205	1365746
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363647

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**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: J1T5N9  
 Sample ID: 342226014  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 09:20  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: 14.4%

Project: WCHN00213  
 Client ID: WCHN001

V3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0275	0.00463	0.0138	mg/kg	1	NORI	02/04/14	1132	1363969	1
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	N	3.50	0.500	3.00	mg/kg	1	HSC	02/05/14	1617	1363648	2
Barium	S	89.0	0.100	0.500	mg/kg	1					
Beryllium		0.699	0.100	0.500	mg/kg	1					
Boron	U	1.00	1.00	5.00	mg/kg	1					
Cadmium	B	0.179	0.100	0.500	mg/kg	1					
Calcium		3010	8.00	25.0	mg/kg	1					
Chromium		12.2	0.150	0.500	mg/kg	1					
Copper		13.0	0.300	1.00	mg/kg	1					
Iron		21100	8.00	25.0	mg/kg	1					
Magnesium		4520	8.50	30.0	mg/kg	1					
Manganese		378	0.200	1.00	mg/kg	1					
Molybdenum	B	0.352	0.200	1.00	mg/kg	1					
Nickel	N	11.4	0.150	0.500	mg/kg	1					
Silicon	S	374	1.50	10.0	mg/kg	1					
Silver	U	0.100	0.100	0.500	mg/kg	1					
Aluminum		6970	6.80	20.0	mg/kg	1	HSC	02/06/14	1047	1363648	3
Sodium		96.3	7.00	25.0	mg/kg	1					
Antimony	DU	1.65	1.65	5.00	mg/kg	5	JWJ	02/07/14	1344	1363648	4
Cobalt	D	11.0	0.750	2.50	mg/kg	5					
Lead	D	17.2	1.65	5.00	mg/kg	5					
Vanadium	D	49.6	0.500	2.50	mg/kg	5					
Potassium		2400	6.40	25.0	mg/kg	1	HSC	02/10/14	0833	1363648	5
Zinc	DN	96.9	2.28	5.70	mg/kg	5	HSC	02/10/14	1341	1365747	6
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.360	0.360	1.09	mg/kg	2	SKJ	02/05/14	1808	1363691	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363690
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	02/10/14	1205	1365746
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363647

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis**

Report Date: March 17, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354  
 Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: XP0045

Client Sample ID: J1TSP0  
 Sample ID: 342226015  
 Matrix: SOIL  
 Collect Date: 30-JAN-14 09:10  
 Receive Date: 31-JAN-14  
 Collector: Client  
 Moisture: <0.1%

Project: WCHN00213  
 Client ID: WCHN001

✓ 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Mercury Analysis-CVAA</b>											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00396	0.00396	0.0118	mg/kg	1	NOR1	02/04/14	1134	1363969	1
<b>Metals Analysis-ICP</b>											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Arsenic	U	0.500	0.500	3.00	mg/kg	1	HSC	02/05/14	1620	1363648	2
Barium	N	1.70	0.100	0.500	mg/kg	1					
Beryllium	U	0.100	0.100	0.500	mg/kg	1					
Boron	U	1.00	1.00	5.00	mg/kg	1					
Cadmium	U	0.100	0.100	0.500	mg/kg	1					
Calcium		39.3	8.00	25.0	mg/kg	1					
Chromium	U	0.150	0.150	0.500	mg/kg	1					
Copper	U	0.300	0.300	1.00	mg/kg	1					
Iron		216	8.00	25.0	mg/kg	1					
Magnesium	B	16.5	8.50	30.0	mg/kg	1					
Manganese		4.98	0.200	1.00	mg/kg	1					
Molybdenum	U	0.200	0.200	1.00	mg/kg	1					
Nickel	U	0.150	0.150	0.500	mg/kg	1					
Silicon	*N	106	1.50	10.0	mg/kg	1					
Silver	U	0.100	0.100	0.500	mg/kg	1					
Aluminum		89.6	6.80	20.0	mg/kg	1	HSC	02/06/14	1050	1363648	3
Sodium	B	8.08	7.00	25.0	mg/kg	1					
Antimony	U	0.330	0.330	1.00	mg/kg	1	JWJ	02/07/14	1347	1363648	4
Cobalt	U	0.150	0.150	0.500	mg/kg	1					
Lead	U	0.330	0.330	1.00	mg/kg	1					
Vanadium	B	0.210	0.100	0.500	mg/kg	1					
Potassium		60.3	6.40	25.0	mg/kg	1	HSC	02/10/14	0836	1363648	5
Zinc	CN	1.66	0.398	0.994	mg/kg	1	HSC	02/10/14	1425	1365747	6
<b>Metals Analysis-ICP-MS</b>											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.318	0.318	1.00	mg/kg	2	SKJ	02/05/14	1811	1363691	7

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	MTM1	02/03/14	1000	1363690
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	02/10/14	1205	1365746
SW846 3050B	SW846 3050B Prep for 6010C	MTM1	02/03/14	1000	1363647

**Appendix 4**  
**Laboratory Narrative and Chain-of-Custody Documentation**

000025

**Metals Fractional Narrative**  
**WC-HANFORD, INC. (WCHN)**  
**SDG XP0045**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
342226001	J1T5M6
342226002	J1T5M7
342226003	J1T5M8
342226004	J1T5M9
342226005	J1T5N0
342226006	J1T5N1
342226007	J1T5N2
342226008	J1T5N3
342226009	J1T5N4
342226010	J1T5N5
342226011	J1T5N6
342226012	J1T5N7
342226013	J1T5N8
342226014	J1T5N9
342226015	J1T5P0
1203028287	Method Blank (MB) ICP
1203028295	Method Blank (MB) ICP
1203033439	Method Blank (MB) ICP
1203028288	Laboratory Control Sample (LCS)
1203028296	Laboratory Control Sample (LCS)
1203033440	Laboratory Control Sample (LCS)
1203028294	342226001(J1T5M6L) Serial Dilution (SD)
1203028299	342226012(J1T5N7L) Serial Dilution (SD)
1203028292	342226001(J1T5M6D) Sample Duplicate (DUP)
1203028297	342226012(J1T5N7D) Sample Duplicate (DUP)
1203028293	342226001(J1T5M6S) Matrix Spike (MS)
1203028298	342226012(J1T5N7S) Matrix Spike (MS)
1203032464	342226001(J1T5M6PS) Post Spike (PS)
1203032323	342226012(J1T5N7PS) Post Spike (PS)
1203033631	342226012(J1T5N7PS) Post Spike (PS)
1203028391	Method Blank (MB) ICP-MS

1203028399	Method Blank (MB) ICP-MS
1203028392	Laboratory Control Sample (LCS)
1203028400	Laboratory Control Sample (LCS)
1203028398	342226001(J1T5M6L) Serial Dilution (SD)
1203028403	342226012(J1T5N7L) Serial Dilution (SD)
1203028396	342226001(J1T5M6D) Sample Duplicate (DUP)
1203028401	342226012(J1T5N7D) Sample Duplicate (DUP)
1203028397	342226001(J1T5M6S) Matrix Spike (MS)
1203028402	342226012(J1T5N7S) Matrix Spike (MS)
1203029153	Method Blank (MB) CVAA
1203029154	Laboratory Control Sample (LCS)
1203029157	342226001(J1T5M6L) Serial Dilution (SD)
1203029155	342226001(J1T5M6D) Sample Duplicate (DUP)
1203029156	342226001(J1T5M6S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

#### Method/Analysis Information

**Analytical Batch:** 1363646, 1363648, 1365747, 1363689, 1363691 and 1363969  
**Prep Batch :** 1363645, 1363647, 1365746, 1363688, 1363690 and 1363967  
**Standard Operating Procedures:** GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 27  
**Analytical Method:** SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B  
**Prep Method :** SW846 3050B and SW846 7471B Prep

#### **Preparation/Analytical Method Verification**

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

#### System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 6100E inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 360+/-7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

#### **Calibration Information**

##### **Instrument Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG).

##### **CRDL Requirements**

The CRDL standard recoveries met the advisory control limits except for the following:

Sodium recovered high in files 020614-1 at 08:47 and 020714A-6 at 14:53. Client sample concentrations for sodium were greater than two times the PQL.

Aluminum recovered high in file 020614-2 at 13:24 and 20:41. Client sample concentrations for aluminum were greater than two times the PQL.

Potassium recovered high in files 020714B-9 at 09:51 and 020714-3 at 14:09. Client sample concentrations for potassium were greater than two times the PQL.

##### **ICSA/ICSAB Statement**

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

##### **Continuing Calibration Blank (CCB) Requirements**

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria except for sodium in file 020714A-6 at 13:46. The sodium concentration in the client sample was greater than five times the amount present in the blank; therefore the data were not

adversely affected.

#### **Continuing Calibration Verification (CCV) Requirements**

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

#### **Quality Control (QC) Information**

##### **Method Blank (MB) Statement**

The MBs analyzed with this SDG met the acceptance criteria.

##### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

##### **Quality Control (QC) Sample Statement**

The following samples were selected as the quality control (QC) samples for this SDG: 342226001 (J1T5M6)-ICP, ICP-MS and CVAA and 342226012 (J1T5N7)-ICP and ICP-MS.

##### **Matrix Spike (MS) Recovery Statement**

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS did not meet all the recommended quality control acceptance criteria for percent recoveries for the applicable analytes. Recoveries for silicon in samples 1203028293 (J1T5M6) and 1203028298 (J1T5N7)-ICP were not within the acceptance limits. Recovery for barium in sample 1203028298 (J1T5N7)-ICP was not within the acceptance limits. Recovery for zinc in sample 1203028298 (J1T5N7)-ICP was not within the acceptance limits. See data exception reports (DER ID 1266258, 1265810, and 1266407) behind the case narrative in this data package.

##### **Duplicate Relative Percent Difference (RPD) Statement**

The relative percent difference (RPD) obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the contract required detection limit (RL), a control of +/- RL is used to evaluate the DUP results. Not all applicable analytes met these requirements. The RPD values for silicon in sample 1203028292 (J1T5M6)-ICP was not within the acceptance limits. See data exception reports (DER ID 1266258) behind the case narrative in this data package.

##### **Post Spike (PS) Recovery Statement**

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for percent recoveries for silicon and verifies the presence of matrix interferences. See data exception report (DER ID 1266258) behind the case narrative in this data package.

##### **Serial Dilution % Difference Statement**

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the

IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. The applicable analytes met the established criteria of less than 10% difference (%D).

### **Technical Information**

#### **Holding Time Specifications**

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

#### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

#### **Sample Dilutions**

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. Dilutions were required for this SDG in order to minimize suppression due to matrix interferences. Samples 342226001 (J1T5M6), 342226002 (J1T5M7), 342226003 (J1T5M8), 342226004 (J1T5M9), 342226005 (J1T5N0), 342226006 (J1T5N1), 342226007 (J1T5N2), 342226008 (J1T5N3), 342226010 (J1T5N5), 342226012 (J1T5N7), 342226013 (J1T5N8) and 342226014 (J1T5N9) were diluted because the titanium concentration exceeded the linear range of the instrument which affected antimony, cobalt, lead, potassium, vanadium, and zinc. Samples 342226006 (J1T5N1) and 342226007 (J1T5N2) were diluted because the manganese concentration exceeded the linear range of the instrument which affected chromium. Samples in this SDG were diluted the standard two times dilution for solids analyzed by ICPMS.

#### **Preparation Information**

The samples in this SDG were prepared exactly according to the cited SOP.

### **Miscellaneous Information**

#### **Electronic Packaging Comment**

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data

validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

**Data Exception (DER) Documentation**

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. Data exception reports (DER ID 1266258, 1265810, and 1266407) were generated for this SDG.

**Additional Comments**

Additional comments were not required for this SDG.

**Certification Statement**

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

**Review Validation:**

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

**The following data validator verified the information presented in this case narrative:**

Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_

DATA EXCEPTION REPORT			
Mo.Day Yr. 07-FEB-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1363648	Sample Numbers: See Below		
<b>Potentially affected work order(s)(SDG): 342226(XP0045)</b>			
<b>Application Issues:</b>			
Failed RPD for DUP			
Failed Recovery for MS/PS			
<b>Specification and Requirements</b> <b>Exception Description:</b>	<b>DER Disposition:</b>		
1. Failed Recovery for MS/PS:  QC 1203028298MS,1203032323PS	1. The matrix spike recovery failed outside of the control limits for barium and silicon. The post spike failed outside the required control limits for silicon but passed for barium. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for barium. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.		

**Originator's Name:**  
Helen Camello 07-FEB-14

**Data Validator/Group Leader:**  
Jamie Johnson 17-MAR-14

DATA EXCEPTION REPORT			
Mo.Day Yr. 10-FEB-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1363646	Sample Numbers: See Below		
<b>Potentially affected work order(s)(SDG): 342221(XP0044),342226(XP0045)</b>			
<b>Application Issues:</b>			
Failed Recovery for MS/PS Method Blank contamination Failed RPD for DUP			
Specification and Requirements Exception Description:	DER Disposition:		
1. Failed Recovery for MS/PS:  QC 1203028290MS,1203028293MS,	1. The matrix spike recovery failed outside of the control limits for silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.		
2. Failed RPD for DUP:  QC 1203028289DUP, 1203028292DUP	2. The sample and sample duplicate % RPD failed outside the control limits for silicon due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.  Sample #342221001 is a multi colored granular solid. Sample #342226001 is a dark brown granular solid.		

Originator's Name:  
Helen Camello 10-FEB-14

Data Validator/Group Leader:  
Theresa McKelvey 11-FEB-14

DATA EXCEPTION REPORT			
Mo.Day Yr. 11-FEB-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1365747	Sample Numbers: See Below		
<b>Potentially affected work order(s)(SDG):342226(XP0045)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS			
<b>Specification and Requirements</b> Exception Description:	<b>DER Disposition:</b>		
1. Failed Recovery for MS/PS:  QC 1203028298MS	1. The matrix spike recovery failed outside of the control limits for zinc. The post spike passed the required control limits for all analytes. This verifies the absence of a matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.		

Originator's Name:  
Helen Camello 11-FEB-14

Data Validator/Group Leader:  
Theresa McKelvey 11-FEB-14

## Washington Closure Hanford

## CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-068

Page 1 of 4  
DUS 1/30/14

Collector RF 1-36-14 BUNNUM, Ad B. Johnson	Company Contact Joan Kessner	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code	Data Turnaround
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-383		SAF No. RC-232	7 days 83	
Ice Chest No. 1CC-07-004	Field Logbook No. EL-1666-01	COA 0603832000	Method of Shipment Commercial Carrier - fed EX		
Shipped To GEL Laboratories Charleston	Offsite Property No. A131047		Bill of Lading/Air Bill No. See OSPC		

Other Labs Shipped To

NA

Preservation

Cool 4C

Type of Container

G/P

## POSSIBLE SAMPLE HAZARDS/REMARKS

None

No. of Container(s)

1

Volume

125mL

## Special Handling and/or Storage

Cool 4C

342226

Sample Analysis

See item (1) in  
Special  
Instructions

Sample No.	Matrix	Sample Date	Sample Time																
J1T5M6	SOIL	1-30-14	0920	x															
J1T5M7	SOIL	1-30-14	1000	x															
J1T5M8	SOIL	1-30-14	0940	x															
J1T5M9	SOIL	1-30-14	0945	x															
J1T5N0	SOIL	1-30-14	0950	x															

## CHAIN OF POSSESSION

## Sign/Print Names

## SPECIAL INSTRUCTIONS

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
R. Johnson 1-30-14 1110 R. Faber 1-30-14

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV) (Mercury)

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
R. Faber 1-30-14 DWShea 1-30-14 1210

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
DWShea 1-30-14 1412 Feed EX

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
P. Dent 1-30-14 1412 P. Dent 1-30-14

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
P. Dent 1-30-14 1412 P. Dent 1-30-14

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
P. Dent 1-30-14 1412 P. Dent 1-30-14

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
P. Dent 1-30-14 1412 P. Dent 1-30-14

Relinquished By/Removed From Date/Time Received By/Stored In Date/Time  
P. Dent 1-30-14 1412 P. Dent 1-30-14

Final Sample Disposition Disposal Method Disposed By Date/Time  
WCH-EE-011

XP0045



Washington Closure Hanford				CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-068	Page 2 of 4 DWS 430/14
Collector B.F. 1-30-14 DUNNUM, AJ B. Johnson	Company Contact Joan Kessner	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code	Data Turnaround				
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-383		SAF No. RC-232	7 days 8B					
Ice Chest No. RCC-07-004	Field Logbook No. EL-1666-01	COA 0603832000	Method of Shipment Commercial Carrier - fed EX						
Shipped To GEL Laboratories Charlston	Offsite Property No. A131047	Bill of Lading/Air Bill No. See OSPC							
Other Labs Shipped To NA	Preservation Type of Container Q/P	Cool 4C							
POSSIBLE SAMPLE HAZARDS/REMARKS None	No. of Container(s)	1							
	Volume	125mL							
	Sample Analysis	See item (1) in Special Instructions							
Special Handling and/or Storage Cool 4C 342226									
Sample No.	Matrix	Sample Date	Sample Time						
J1T5N1	SOIL	1-30-14	1025	X					
J1T5N2	SOIL	1-30-14	1030	X					
J1T5N3	SOIL	1-30-14	1040	X					
J1T5N4	SOIL	1-30-14	1035	X					
J1T5N5	SOIL	1-30-14	1100	X					
CHAIN OF POSSESSION				Sign/Print Names					
Relinquished By/Removed From R. Febbley 1-30-14	Date/Time 1110	Received By/Stored In R. Febbley R. Febbley 1-30-14	Date/Time 1110	SPECIAL INSTRUCTIONS					
Relinquished By/Removed From R. Febbley 1-30-14	Date/Time 1210	Received By/Stored In JWShea DWSTHEA 1-30-14	Date/Time 1210	(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV) (Mercury)					
Relinquished By/Removed From DWSTHEA 1-30-14 1412	Date/Time WCH	Received By/Stored In Fed EX	Date/Time						
Relinquished By/Removed From	Date/Time	Received By/Stored In P. Dent Patricia DENT	Date/Time 0910						
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time						
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time						
FINAL SAMPLE DISPOSITION WCH-EE-011	Disposal Method	Disposed By	Date/Time						



XP0045

## Washington Closure Hanford

## CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

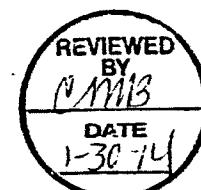
RC-232-068

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DWS 1-30-14

Collector P.F. 1-30-14 <u>DUNNIN, AJ</u> <u>B. Johnson</u>	Company Contact Joan Kessner	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 7 days 8B
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-383		SAF No. RC-232	Data Turnaround
Ce Chest No. <u>RCC-07-004</u>	Field Logbook No. EL-1666-01	COA 0603832000	Method of Shipment Commerical Carrier	<i>fed EX</i>
Shipped To GEL Laboratories Charleston	Offsite Property No. <u>A131047</u>		Bill of Lading/Air Bill No.	<i>SPC OSPC</i>
Other Labs Shipped To <i>NA</i>		Preservation Cool 4C		
		Type of Container G/P		
POSSIBLE SAMPLE HAZARDS/REMARKS None		No. of Container(s) 1		
		Volume 125mL		
Special Handling and/or Storage Cool 4C <i>342226</i>		Sample Analysis See item (1) in Special Instructions		
Sample No.	Matrix	Sample Date 1-30-14	Sample Time 1105	
J1T5N6	SOIL	1-30-14	1105	x
J1T5N7	SOIL		DWS 1/29/14	
J1T5N8	SOIL	1-30-14	1045	x
J1T5N9	SOIL	1-30-14	0920	x
J1T5P0	SOIL	1-30-14	0910	x
CHAIN OF POSSESSION				
Relinquished By/Removed From <i>Johns, B. Johnson</i>	Date/Time 1-30-14	Received By/Stored In <i>Pfleiderer, R. Fehlberg</i>	Date/Time 1-30-14	Sign/Print Names
Relinquished By/Removed From <i>R. Fehlberg</i>	Date/Time 1-30-14	Received By/Stored In <i>DWSHEA</i>	Date/Time 1-30-14	
Relinquished By/Removed From <i>DWSHEA</i>	Date/Time 1-30-14	Received By/Stored In <i>Fed EX</i>	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time	

## SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV) (Mercury)



XP0045

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CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-068	Page 3 of 3 DWS /30/14
Collector <u>DUNNUM, AJ</u>	<u>Johnson</u> 1-30-14 JMB	Company Contact Joan Kessner	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code Data Turnaround
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-383			SAF No. RC-232	7 days 8B
Ice Chest No. <u>RCC-07-004</u>	Field Logbook No. EL-1666-01	COA 0603832000	Method of Shipment Commercial Carrier - fed EX		
Shipped To GEL Laboratories Charleston	Offsite Property No. <u>A131047</u>			Bill of Lading/Air Bill No. See CSPC	
Other Labs Shipped To <u>NH</u>	Preservation	Cool 4C			
	Type of Container	G/P			
POSSIBLE SAMPLE HAZARDS/REMARKS None	No. of Container(s)	1			
	Volume	125mL			
Special Handling and/or Storage Cool 4C <u>342226</u>	Sample Analysis	See item (1) in Special Instructions			
Sample No.	Matrix	Sample Date	Sample Time		
J1T5N6	SOIL		DWS 1/29/14		
J1T5N7	SOIL	1/29/14	1022 ✓		
J1T5N8	SOIL		DWS 1/29/14		
J1T5N9	SOIL		DWS 1/29/14		
J1T5P0	SOIL		DWS 1/29/14		
CHAIN OF POSSESSION				SIGN/PRINT NAMES	
Relinquished By/Removed From <u>Brady Johnson</u>	Date/Time 1-29-14/1549	Received By/Stored In <u>WCH</u>	Date/Time 1/29/14 1549	SPECIAL INSTRUCTIONS	
Relinquished By/Removed From <u>JWshan DWS/FEAT</u>	Date/Time 1/29/14 1744	Received By/Stored In <u>Fridge 3A</u>	Date/Time 1/29/14 1744	(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV) (Mercury)	
Relinquished By/Removed From <u>X Fridge 3A Bottile</u>	Date/Time 1/30/14 1400	Received By/Stored In <u>Bottile</u>	Date/Time 1/30/14 1400		
Relinquished By/Removed From <u>JWshan DWS/FEAT</u>	Date/Time 1/30/14 1412	Received By/Stored In <u>fed EX</u>	Date/Time		
Relinquished By/Removed From	Date/Time	Received By/Stored In <u>P. Dent Patrick DENT</u>	Date/Time 1-31-14 09:10		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time		
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time		

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**Appendix 5**  
**Data Validation Supporting Documentation**

APPENDIX 5

## INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 600-383			(C)		
VALIDATOR: ECR	LAB: Crc			DATE: 3/13/14	
			SDG: X P0045		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
JIT5M6	JIT5M7	JIT5M8	JIT5M9		
JIT5N0	JIT5N1	JIT5N2	JIT5N3		
JIT5N4	JIT5N5	JIT5N6	JIT5N7		
JIT5N8	JIT5N9	JIT5P0			
SIC					

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes  No  N/A  
 Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## 2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes  No  N/A  
 Initial calibrations acceptable? ..... Yes  No  N/A  
 ICP interference checks acceptable? ..... Yes  No  N/A  
 ICV and CCV checks performed on all instruments? ..... Yes  No  N/A  
 ICV and CCV checks acceptable? ..... Yes  No  N/A  
 Standards traceable? ..... Yes  No  N/A  
 Standards expired? ..... Yes  No  N/A  
 Calculation check acceptable? ..... Yes  No  N/A  
 Comments: \_\_\_\_\_  
 \_\_\_\_\_

## INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

## 3. BLANKS (Levels B, C, D, and E)

- ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A
- ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A
- Laboratory blanks analyzed? ..... Yes No N/A
- Laboratory blank results acceptable? ..... Yes No N/A
- Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A
- Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A
- Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: NA - 01, PO - UJ ←  
3/10n zinc + sodium

FB - 10 detected

## 4. ACCURACY (Levels C, D, and E)

- MS/MSD samples analyzed? ..... Yes No N/A
- MS/MSD results acceptable? ..... Yes No N/A
- MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A
- MS/MSD standards expired? (Levels D, E) ..... Yes No N/A
- LCS/BSS samples analyzed? ..... Yes No N/A
- LCS/BSS results acceptable? ..... Yes No N/A
- Standards traceable? (Levels D, E) ..... Yes No N/A
- Standards expired? (Levels D, E) ..... Yes No N/A
- Transcription/calculation errors? (Levels D, E) ..... Yes No N/A
- Performance audit sample(s) analyzed? ..... Yes No N/A
- Performance audit sample results acceptable? ..... Yes No N/A

Comments: MS - silicon (15.9%) & (16%) Taef  
Voron (69.5%) Taef - 4 NT-PO  
21/14

NO AT

000041

## INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

## 5. PRECISION (Levels C, D, and E)

- Duplicate RPD values acceptable? .....  Yes  No  N/A
- Duplicate results acceptable? .....  Yes  No  N/A
- MS/MSD standards NIST traceable? (Levels D, E) .....  Yes  No  N/A
- MS/MSD standards expired? (Levels D, E) .....  Yes  No  N/A
- Field duplicate RPD values acceptable? .....  Yes  No  N/A
- Field split RPD values acceptable? .....  Yes  No  N/A
- Transcription/calculation errors? (Levels D, E) .....  Yes  No  N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

*-FD ~16 outside 3/m*

\_\_\_\_\_

## 6. ICP QUALITY CONTROL (Levels D and E)

- ICP serial dilution samples analyzed? .....  Yes  No  N/A
- ICP serial dilution %D values acceptable? .....  Yes  No  N/A
- ICP post digestion spike required? .....  Yes  No  N/A
- ICP post digestion spike values acceptable? .....  Yes  No  N/A
- Standards traceable? .....  Yes  No  N/A
- Standards expired? .....  Yes  No  N/A
- Transcription/calculation errors? .....  Yes  No  N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**INORGANIC ANALYSIS DATA VALIDATION CHECKLIST****7. FURNACE AA QUALITY CONTROL (Levels D and E)**

Duplicate injections performed as required? .....	Yes	No	N/A
Duplicate injection %RSD values acceptable? .....	Yes	No	N/A
Analytical spikes performed as required?.....	Yes	No	N/A
Analytical spike recoveries acceptable?.....	Yes	No	N/A
Standards traceable? .....	Yes	No	N/A
Standards expired?.....	Yes	No	N/A
MSA performed as required?.....	Yes	No	N/A
MSA results acceptable?.....	Yes	No	N/A
Transcription/calculation errors? .....	Yes	No	N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**8. HOLDING TIMES (all levels)**

Samples properly preserved?.....	Yes	No	N/A
Sample holding times acceptable? .....	Yes	No	N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**INORGANIC ANALYSIS DATA VALIDATION CHECKLIST**

**9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)**

Results reported for all requested analyses? .....  Yes  No  N/A

Results supported in the raw data? (Levels D, E) .....  Yes  No  N/A

Samples properly prepared? (Levels D, E) .....  Yes  No  N/A

Detection limits meet RDL? .....  Yes  No  N/A

Transcription/calculation errors? (Levels D, E) .....  Yes  No  N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6000044

**Appendix 6**  
**Additional Documentation Requested by Client**

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - [www.gel.com](http://www.gel.com)

**QC Summary**

Report Date: March 17, 2014

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WC-Hanford, Inc.  
2620 Fermi Avenue  
MSIN H4-21  
Richland, Washington  
Contact: Joan Kessner

Workorder:	342226	Client SDG: XP0045			Project Description: RC-232 Soil							
Paramname		NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>												
Batch	1363689											
Selenium	QC1203028396	342226001	DUP		DU	0.349	DU	0.350	mg/kg	N/A ^	SKJ	02/06/14 04:25
Selenium	QC1203028392	LCS		4.69		D		4.65	mg/kg	99 (80%-120%)		02/06/14 02:02
Selenium	QC1203028391	MB				DU		0.308	mg/kg			02/06/14 01:56
Selenium	QC1203028397	342226001	MS	5.53	DU	0.349	D	4.97	mg/kg	86.2 (75%-125%)		02/06/14 04:31
Selenium	QC1203028398	342226001	SDILT		DU	0.956	DU	1.75	ug/L	N/A	(0%-10%)	02/06/14 04:43
Batch	1363691											
Selenium	QC1203028401	342226012	DUP		DU	0.380	DU	0.353	mg/kg	N/A ^	SKJ	02/05/14 17:48
Selenium	QC1203028400	LCS		4.62		D		4.68	mg/kg	101 (80%-120%)		02/05/14 17:36
Selenium	QC1203028399	MB				DU		0.298	mg/kg			02/05/14 17:33
Selenium	QC1203028402	342226012	MS	5.91	DU	0.380	D	5.46	mg/kg	92.2 (75%-125%)		02/05/14 17:51
Selenium	QC1203028403	342226012	SDILT		DU	0.053	DU	1.90	ug/L	N/A	(0%-10%)	02/05/14 17:56
<b>Metals Analysis-ICP</b>												
Batch	1363646											
Aluminum	QC1203028292	342226001	DUP			7510		7210	mg/kg	4.12 (0%-20%)	HSC	02/06/14 19:57
Antimony					DU	3.30	DU	3.76	mg/kg	N/A ^	JWJ	02/07/14 11:20
Arsenic						3.85	B	2.81	mg/kg	31.2 ^ (+/-3.42)	HSC	02/05/14 17:38
Barium					N	89.5		87.7	mg/kg	2.02 (0%-20%)		

**GEL LABORATORIES LLC**  
2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - [www.gel.com](http://www.gel.com)

**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 2 of 13	
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1363646										
Beryllium		0.743		0.722	mg/kg	2.83	^	(+/-0.570)			
Boron	U	1.00	U	1.14	mg/kg	N/A	^		HSC	02/05/14	17:38
Cadmium	B	0.166	B	0.227	mg/kg	31.3	^	(+/-0.570)			
Calcium		3200		3110	mg/kg	2.96		(0%-20%)			
Chromium		11.7		11.7	mg/kg	0.353		(0%-20%)		02/06/14	19:57
Cobalt	D	11.6	D	11.6	mg/kg	0.340	^	(+/-5.70)	JWJ	02/07/14	11:20
Copper		13.1		13.0	mg/kg	1.10		(0%-20%)	HSC	02/05/14	17:38
Iron		21900		21400	mg/kg	2.36		(0%-20%)			
Lead	D	19.7	D	20.8	mg/kg	5.50	^	(+/-11.4)	JWJ	02/07/14	11:20
Magnesium		4590		4520	mg/kg	1.65		(0%-20%)	HSC	02/05/14	17:38
Manganese		381		377	mg/kg	0.969		(0%-20%)			
Molybdenum	B	0.246	B	0.414	mg/kg	50.9	^	(+/-1.14)			
Nickel		11.3		11.1	mg/kg	1.22		(0%-20%)			
Potassium	D	2510	D	2560	mg/kg	1.66		(0%-20%)	JWJ	02/07/14	11:20
Silicon	*N	401	*	523	mg/kg	26.5*		(0%-20%)	HSC	02/05/14	17:38
Silver	U	0.100	U	0.114	mg/kg	N/A	^				
Sodium		151		156	mg/kg	2.99		(0%-20%)		02/07/14	14:05
Vanadium	D	54.9	D	52.6	mg/kg	4.26		(0%-20%)	JWJ	02/07/14	11:20
Zinc	DN	94.3	D	93.6	mg/kg	0.661		(0%-20%)			
QC1203028288	LCS										
Aluminum		473		454	mg/kg	96.1	(80%-120%)	HSC	02/06/14	19:12	
Antimony		47.3		50.0	mg/kg	106	(80%-120%)	JWJ	02/07/14	10:24	
Arsenic		47.3		45.8	mg/kg	96.9	(80%-120%)	HSC	02/05/14	16:53	

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil							Page 3 of 13	
Paramname		NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anist	Date	Time
Metals Analysis-ICP												
Batch	1363646											
Barium		47.3			48.3	mg/kg		102	(80%-120%)	HSC	02/05/14	16:53
Beryllium		47.3			50.3	mg/kg		107	(80%-120%)			
Boron		47.3			46.7	mg/kg		98.7	(80%-120%)			
Cadmium		47.3			48.2	mg/kg		102	(80%-120%)			
Calcium		473			505	mg/kg		107	(80%-120%)			
Chromium		47.3			44.3	mg/kg		93.8	(80%-120%)		02/06/14	19:12
Cobalt		47.3			48.3	mg/kg		102	(80%-120%)	JWJ	02/07/14	10:24
Copper		47.3			49.8	mg/kg		105	(80%-120%)	HSC	02/05/14	16:53
Iron		473			507	mg/kg		107	(80%-120%)			
Lead		47.3			49.4	mg/kg		104	(80%-120%)	JWJ	02/07/14	10:24
Magnesium		473			520	mg/kg		110	(80%-120%)	HSC	02/05/14	16:53
Manganese		47.3			49.1	mg/kg		104	(80%-120%)			
Molybdenum		47.3			48.0	mg/kg		101	(80%-120%)			
Nickel		47.3			49.4	mg/kg		105	(80%-120%)			
Potassium		473			493	mg/kg		104	(80%-120%)	JWJ	02/07/14	10:24
Silicon		473			417	mg/kg		88.3	(80%-120%)	HSC	02/05/14	16:53
Silver		47.3			48.4	mg/kg		102	(80%-120%)			
Sodium		473			458	mg/kg		96.8	(80%-120%)		02/07/14	13:18
Vanadium		47.3			49.0	mg/kg		104	(80%-120%)	JWJ	02/07/14	10:24
Zinc		47.3			50.5	mg/kg		107	(80%-120%)			
QC1203028287	MB											
Aluminum					U	6.48	mg/kg				HSC	02/06/14 19:09

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 4 of 13		
Paramname		NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>												
Batch	1363646											
Antimony		B		0.373		mg/kg				JWJ	02/07/14	10:21
Arsenic		U		0.476		mg/kg				HSC	02/05/14	16:50
Barium		U		0.0952		mg/kg						
Beryllium		U		0.0952		mg/kg						
Boron		U		0.952		mg/kg						
Cadmium		U		0.0952		mg/kg						
Calcium		U		7.62		mg/kg						
Chromium		U		0.143		mg/kg					02/06/14	19:09
Cobalt		U		0.143		mg/kg				JWJ	02/07/14	10:21
Copper		U		0.286		mg/kg				HSC	02/05/14	16:50
Iron		U		7.62		mg/kg						
Lead		U		0.314		mg/kg				JWJ	02/07/14	10:21
Magnesium		U		8.10		mg/kg				HSC	02/05/14	16:50
Manganese		U		0.190		mg/kg						
Molybdenum		U		0.190		mg/kg						
Nickel		U		0.143		mg/kg						
Potassium		B		8.95		mg/kg				JWJ	02/07/14	10:21
Silicon		U		1.43		mg/kg				HSC	02/05/14	16:50
Silver		U		0.0952		mg/kg						
Sodium		B		-9.48		mg/kg					02/07/14	13:15
Vanadium		U		0.0952		mg/kg				JWJ	02/07/14	10:21

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 5 of 13	
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1363646										
Zinc			B	0.739	mg/kg						
QC1203028293	342226001	MS									
Aluminum	561		7510	9780	mg/kg	N/A	(75%-125%)	HSC	02/06/14	19:59	
Antimony	56.1	DU	3.30	D	48.7	mg/kg	86.8	(75%-125%)	JWJ	02/07/14	11:23
Arsenic	56.1		3.85		54.5	mg/kg	90.2	(75%-125%)	HSC	02/05/14	17:41
Barium	56.1	N	89.5		142	mg/kg	93.9	(75%-125%)			
Beryllium	56.1		0.743		56.7	mg/kg	99.7	(75%-125%)			
Boron	56.1	U	1.00		50.9	mg/kg	90.8	(75%-125%)			
Cadmium	56.1	B	0.166		52.6	mg/kg	93.4	(75%-125%)			
Calcium	561		3200		3890	mg/kg	N/A	(75%-125%)			
Chromium	56.1		11.7		61.2	mg/kg	88.2	(75%-125%)		02/06/14	19:59
Cobalt	56.1	D	11.6	D	70.7	mg/kg	105	(75%-125%)	JWJ	02/07/14	11:23
Copper	56.1		13.1		71.5	mg/kg	104	(75%-125%)	HSC	02/05/14	17:41
Iron	561		21900		24100	mg/kg	N/A	(75%-125%)			
Lead	56.1	D	19.7	D	73.2	mg/kg	95.3	(75%-125%)	JWJ	02/07/14	11:23
Magnesium	561		4590		5460	mg/kg	N/A	(75%-125%)	HSC	02/05/14	17:41
Manganese	56.1		381		436	mg/kg	N/A	(75%-125%)			
Molybdenum	56.1	B	0.246		53.5	mg/kg	94.9	(75%-125%)			
Nickel	56.1		11.3		65.9	mg/kg	97.4	(75%-125%)			
Potassium	561	D	2510	D	3220	mg/kg	N/A	(75%-125%)	JWJ	02/07/14	11:23
Silicon	561	*N	401	N	489	mg/kg	15.8*	(75%-125%)	HSC	02/05/14	17:41
Silver	56.1	U	0.100		54.3	mg/kg	96.8	(75%-125%)			
Sodium	561		151		708	mg/kg	99.3	(75%-125%)		02/07/14	14:08

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil							Page 6 of 13	
Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time	
<b>Metals Analysis-ICP</b>												
Batch	1363646											
Vanadium	56.1	D	54.9	D	112	mg/kg	102	(75%-125%)	JWJ	02/07/14	11:23	
Zinc	56.1	DN	94.3	D	145	mg/kg	89.6	(75%-125%)				
Silicon	5000	*N	4010		19800	ug/L	316*	(80%-120%)	HSC	02/07/14	14:10	
Aluminum	75100	D	15800		ug/L	5.5		(0%-10%)		02/06/14	20:02	
Antimony	DU	-2.55	DU	16.5	ug/L	N/A		(0%-10%)	JWJ	02/07/14	11:26	
Arsenic		38.5	D	7.28	ug/L	5.44		(0%-10%)	HSC	02/05/14	17:43	
Barium	N	895	D	185	ug/L	3.44		(0%-10%)				
Beryllium		7.43	D	1.92	ug/L	29.4		(0%-10%)				
Boron	U	-3.74	DU	5.00	ug/L	N/A		(0%-10%)				
Cadmium	B	1.66	DU	0.500	ug/L	N/A		(0%-10%)				
Calcium	32000	D	6570		ug/L	2.48		(0%-10%)				
Chromium	117	D	23.5		ug/L	.273		(0%-10%)		02/06/14	20:02	
Cobalt	D	11.6	D	1.53	ug/L	34.2		(0%-10%)	JWJ	02/07/14	11:26	
Copper		131	D	25.0	ug/L	4.73		(0%-10%)	HSC	02/05/14	17:43	
Iron	219000	D	45300		ug/L	3.5		(0%-10%)				
Lead	D	19.7	D	4.72	ug/L	19.9		(0%-10%)	JWJ	02/07/14	11:26	
Magnesium	45900	D	9460		ug/L	2.99		(0%-10%)	HSC	02/05/14	17:43	
Manganese	3810	D	802		ug/L	5.34		(0%-10%)				
Molybdenum	B	2.46	DU	1.00	ug/L	N/A		(0%-10%)				
Nickel		113	D	24.5	ug/L	8.99		(0%-10%)				
Potassium	D	2510	D	531	ug/L	5.74		(0%-10%)	JWJ	02/07/14	11:26	

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**QC Summary**

Workorder: 342226 Client SDG: XP0045 Project Description: RC-232 Soil Page 7 of 13

Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1363646										
Silicon	*N	4010	D	820	ug/L	2.33		(0%-10%)	HSC	02/05/14	17:43
Silver	U	-2.82	DU	0.500	ug/L	N/A		(0%-10%)			
Sodium		1510	D	512	ug/L	69		(0%-10%)		02/07/14	14:13
Vanadium	D	54.9	D	10.5	ug/L	4.52		(0%-10%)	JWJ	02/07/14	11:26
Zinc	DN	94.2	D	17.4	ug/L	7.75		(0%-10%)			
Batch	1363648										
QC1203028297	342226012	DUP									
Aluminum		6360		6350	mg/kg	0.192		(0%-20%)	HSC	02/06/14	10:56
Antimony	DU	1.83	DU	1.65	mg/kg	N/A ^			JWJ	02/07/14	13:53
Arsenic	B	2.86		3.85	mg/kg	29.7 ^		(+/-3.00)	HSC	02/05/14	16:26
Barium	N	82.4		79.0	mg/kg	4.19		(0%-20%)			
Beryllium		0.623		0.600	mg/kg	3.68 ^		(+/-0.500)			
Boron	U	1.11	U	1.00	mg/kg	N/A ^					
Cadmium	B	0.478	B	0.491	mg/kg	2.82 ^		(+/-0.500)			
Calcium		3060		2930	mg/kg	4.61		(0%-20%)			
Chromium		13.0		12.4	mg/kg	4.70		(0%-20%)			
Cobalt	D	9.70	D	9.51	mg/kg	1.93 ^		(+/-2.50)	JWJ	02/07/14	13:53
Copper		32.3		29.1	mg/kg	10.5		(0%-20%)	HSC	02/05/14	16:26
Iron		19100		18000	mg/kg	5.86		(0%-20%)			
Lead	D	37.8	D	32.6	mg/kg	14.9		(0%-20%)	JWJ	02/07/14	13:53
Magnesium		3950		3850	mg/kg	2.49		(0%-20%)	HSC	02/05/14	16:26
Manganese		380		427	mg/kg	11.5		(0%-20%)			

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 8 of 13	
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1363648										
Molybdenum		B	0.249	B	0.321	mg/kg	25.1 ^	(+/-1.00)			
Nickel			11.1		11.0	mg/kg	0.950	(0%-20%)	HSC	02/05/14	16:26
Potassium			2190		1900	mg/kg	14.0	(0%-20%)		02/10/14	08:41
Silicon		*N	385		359	mg/kg	7.02	(0%-20%)		02/05/14	16:26
Silver		U	0.111	U	0.100	mg/kg	N/A ^				
Sodium			74.4		60.6	mg/kg	20.5 ^	(+/-25.0)		02/06/14	10:56
Vanadium		D	42.6	D	40.4	mg/kg	5.35	(0%-20%)	JWJ	02/07/14	13:53
QC1203028296	LCS										
Aluminum		474			478	mg/kg	101	(80%-120%)	HSC	02/06/14	10:42
Antimony		47.4			48.2	mg/kg	102	(80%-120%)	JWJ	02/07/14	13:38
Arsenic		47.4			46.0	mg/kg	96.9	(80%-120%)	HSC	02/05/14	16:11
Barium		47.4			48.5	mg/kg	102	(80%-120%)			
Beryllium		47.4			50.8	mg/kg	107	(80%-120%)			
Boron		47.4			46.8	mg/kg	98.6	(80%-120%)			
Cadmium		47.4			48.4	mg/kg	102	(80%-120%)			
Calcium		474			505	mg/kg	106	(80%-120%)			
Chromium		47.4			47.9	mg/kg	101	(80%-120%)			
Cobalt		47.4			49.1	mg/kg	104	(80%-120%)	JWJ	02/07/14	13:38
Copper		47.4			50.1	mg/kg	106	(80%-120%)	HSC	02/05/14	16:11
Iron		474			508	mg/kg	107	(80%-120%)			
Lead		47.4			49.9	mg/kg	105	(80%-120%)	JWJ	02/07/14	13:38
Magnesium		474			521	mg/kg	110	(80%-120%)	HSC	02/05/14	16:11
Manganese		47.4			49.2	mg/kg	104	(80%-120%)			

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 9 of 13	
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1363648										
Molybdenum	47.4			47.9	mg/kg	101	(80%-120%)	HSC	02/05/14	16:11	
Nickel	47.4			49.5	mg/kg	104	(80%-120%)				
Potassium	474			501	mg/kg	106	(80%-120%)		02/10/14	08:27	
Silicon	474			424	mg/kg	89.4	(80%-120%)		02/05/14	16:11	
Silver	47.4			48.3	mg/kg	102	(80%-120%)				
Sodium	474			459	mg/kg	96.7	(80%-120%)		02/06/14	10:42	
Vanadium	47.4			49.8	mg/kg	105	(80%-120%)	JWJ	02/07/14	13:38	
QC1203028295 MB Aluminum			U	6.15	mg/kg			HSC	02/06/14	10:38	
Antimony			U	0.298	mg/kg			JWJ	02/07/14	13:36	
Arsenic			U	0.452	mg/kg			HSC	02/05/14	16:08	
Barium			U	0.0904	mg/kg						
Beryllium			U	0.0904	mg/kg						
Boron			U	0.904	mg/kg						
Cadmium			U	0.0904	mg/kg						
Calcium			U	7.23	mg/kg						
Chromium			U	0.136	mg/kg						
Cobalt			U	0.136	mg/kg			JWJ	02/07/14	13:36	
Copper			U	0.271	mg/kg			HSC	02/05/14	16:08	
Iron			U	7.23	mg/kg						
Lead			U	0.298	mg/kg			JWJ	02/07/14	13:36	
Magnesium			U	7.69	mg/kg			HSC	02/05/14	16:08	

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil							Page 10 of 13	
Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlat	Date	Time	
<b>Metals Analysis-ICP</b>												
Batch	1363648											
Manganese				U	0.181	mg/kg				HSC	02/05/14 16:08	
Molybdenum				U	0.181	mg/kg						
Nickel				U	0.136	mg/kg						
Potassium				B	6.94	mg/kg				02/10/14 08:24		
Silicon				B	2.28	mg/kg				02/05/14 16:08		
Silver				U	0.0904	mg/kg						
Sodium				B	-11.5	mg/kg				02/06/14 10:38		
Vanadium				U	0.0904	mg/kg				JWJ	02/07/14 13:36	
QC1203028298	342226012	MS										
Aluminum	498		6360		8420	mg/kg				N/A	(75%-125%)	
Antimony	49.8	DU	1.83	D	40.1	mg/kg				80.6	(75%-125%)	
Arsenic	49.8	B	2.86		48.1	mg/kg				90.8	(75%-125%)	
Barium	49.8	N	82.4	N	117	mg/kg				69.5*	(75%-125%)	
Beryllium	49.8		0.623		49.9	mg/kg				98.9	(75%-125%)	
Boron	49.8	U	1.11		45.1	mg/kg				90.5	(75%-125%)	
Cadmium	49.8	B	0.478		47.2	mg/kg				93.8	(75%-125%)	
Calcium	498		3060		3130	mg/kg				N/A	(75%-125%)	
Chromium	49.8		13.0		57.9	mg/kg				90.2	(75%-125%)	
Cobalt	49.8	D	9.70	D	58.9	mg/kg				98.8	(75%-125%)	
Copper	49.8		32.3		81.4	mg/kg				98.5	(75%-125%)	
Iron	498		19100		18200	mg/kg				N/A	(75%-125%)	
Lead	49.8	D	37.8	D	83.3	mg/kg				91.4	(75%-125%)	
										JWJ	02/07/14 13:56	

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 11 of 13	
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anist	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1363648										
Magnesium	498	3950		4220	mg/kg		N/A	(75%-125%)	HSC	02/05/14	16:29
Manganese	49.8	380		379	mg/kg		N/A	(75%-125%)			
Molybdenum	49.8	B	0.249	47.4	mg/kg		94.6	(75%-125%)			
Nickel	49.8		11.1	57.9	mg/kg		93.9	(75%-125%)			
Potassium	498	2190		2420	mg/kg		N/A	(75%-125%)		02/10/14	08:44
Silicon	498	*N	385 N	425	mg/kg	8.06*	(75%-125%)			02/05/14	16:29
Silver	49.8	U	0.111	47.6	mg/kg	95.7	(75%-125%)				
Sodium	498		74.4	517	mg/kg	88.9	(75%-125%)			02/06/14	10:58
Vanadium	49.8	D	42.6 D	88.9	mg/kg	93.1	(75%-125%)	JWJ	02/07/14	13:56	
QC1203032323 342226012 PS											
Barium	500	N	742	1300	ug/L	112	(80%-120%)	HSC	02/07/14	11:28	
Silicon	5000	*N	3470	22100	ug/L	373*	(80%-120%)				
QC1203028299 342226012 SDILT											
Aluminum			57300 D	12400	ug/L	7.92		(0%-10%)		02/06/14	11:00
Antimony		DU	-2.78 DU	9.16	ug/L	N/A		(0%-10%)	JWJ	02/07/14	14:02
Arsenic		B	25.7 DU	2.78	ug/L	N/A		(0%-10%)	HSC	02/05/14	16:31
Barium		N	742 D	152	ug/L	2.6		(0%-10%)			
Beryllium			5.61 D	1.45	ug/L	29.3		(0%-10%)			
Boron		U	-2.66 DU	5.55	ug/L	N/A		(0%-10%)			
Cadmium		B	4.30 D	1.05	ug/L	21.8		(0%-10%)			
Calcium			27600 D	5560	ug/L	.699		(0%-10%)			
Chromium			117 D	22.8	ug/L	2.85		(0%-10%)			
Cobalt		D	17.5 D	3.31	ug/L	5.36		(0%-10%)	JWJ	02/07/14	14:02

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil						Page 12 of 13		
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time	
<b>Metals Analysis-ICP</b>												
Batch	1363648											
Copper		291	D	56.8	ug/L	2.46		(0%-10%)	HSC	02/05/14	16:31	
Iron		172000	D	35000	ug/L	1.73		(0%-10%)				
Lead		D	68.2	D	13.3	ug/L	2.21	(0%-10%)	JWJ	02/07/14	14:02	
Magnesium		35600	D	7210	ug/L	1.28		(0%-10%)	HSC	02/05/14	16:31	
Manganese		3420	D	713	ug/L	4.09		(0%-10%)				
Molybdenum		B	2.25	DU	1.11	ug/L	N/A	(0%-10%)				
Nickel			100	D	21.1	ug/L	5.21	(0%-10%)				
Potassium		19700	D	3980	ug/L	.9		(0%-10%)		02/10/14	08:46	
Silicon		*N	3470	D	712	ug/L	2.52	(0%-10%)		02/05/14	16:31	
Silver		U	-0.871	DU	0.555	ug/L	N/A	(0%-10%)				
Sodium			670	D	87.9	ug/L	34.5	(0%-10%)		02/06/14	11:00	
Vanadium		D	76.7	D	15.3	ug/L	.467	(0%-10%)	JWJ	02/07/14	14:02	
Batch	1365747											
Zinc	QC1203028297	342226012	DUP									
Zinc				DN	172	D	162	mg/kg	5.77	(0%-20%)	HSC	02/10/14 13:53
Zinc	QC1203033440	LCS										
Zinc					47.1			mg/kg		101	(80%-120%)	02/10/14 13:31
Zinc	QC1203033439	MB										
Zinc						B	0.411	mg/kg				02/10/14 13:27
Zinc	QC1203028298	342226012	MS									
Zinc					57.1	DN	172	DN	244	mg/kg	126*	(75%-125%)
Zinc	QC1203033631	342226012	PS									
Zinc					500	DN	300	D	888	ug/L	118	(80%-120%)
Zinc	QC1203028299	342226012	SDILT									
Zinc						DN	300	D	57.4	ug/L	4.23	(0%-10%)
<b>Metals Analysis-Mercury</b>												

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**QC Summary**

Workorder:	342226	Client SDG:	XP0045	Project Description: RC-232 Soil					Page 13 of 13		
Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-Mercury</b>											
Batch	1363969										
Mercury	QC1203029155	342226001	DUP	0.0212	0.0167	mg/kg	24.0	^	(+/-0.0134)	NOR1	02/04/14 10:58
Mercury	QC1203029154	LCS		0.116	0.107	mg/kg	92.3	(80%-120%)			02/04/14 10:55
Mercury	QC1203029153	MB			U	0.00392	mg/kg				02/04/14 10:53
Mercury	QC1203029156	342226001	MS	0.136	0.0212	0.156	mg/kg	99.5	(80%-120%)		02/04/14 11:00
Mercury	QC1203029157	342226001	SDILT		0.310 DU	0.023	ug/L	N/A	(0%-10%)		02/04/14 11:02

**Notes:**

The Qualifiers in this report are defined as follows:

- \* Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

<sup>^</sup> The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.